

John Philoponus

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John Philoponus, a Christian philosopher, scientist, and theologian who lived approximately from 490 to 570, is also known as John the Grammarian or John of Alexandria. The epithet 'Philoponus' means literally 'Lover of toil'. Philoponus' life and work are closely connected to the city of Alexandria and the Alexandrian Neoplatonic school. Although the Aristotelian-Neoplatonic tradition was the source of his intellectual roots and concerns, he was an original thinker who eventually broke with that tradition in many important respects, both substantive and methodological, and cleared part of the way which led to more critical and empirical approaches in the natural sciences. Which intellectual, religious, or other cultural circumstances of his life and times may have put Philoponus into the position to initiate and foreshadow the eventual demise of Aristotelianism is one of the most fascinating questions anyone who tries to arrive at a fuller appreciation of the work of this important late Greek philosopher faces....

2.2 Theory of Impetus

The *Physics* commentary contains an array of examples of innovative and damagingly critical commentary. One of the most celebrated achievements is the theory of impetus, which is commonly regarded as a decisive step away from an Aristotelian dynamics towards a modern theory based on the notion of inertia. Concepts akin to those deployed in Philoponus' impetus theory appear in earlier writers such as Hipparchus (2nd c. BCE) and Synesius (4th c. CE), but Philoponus nowhere intimates that he was influenced by any one of them. As far as one can tell from the text *In Phys.* 639-42, he takes his point of departure from an unsatisfactory Aristotelian answer to a problem that was to puzzle scientists for centuries: Why does an arrow continue to fly after it has left the bow-string, or a stone after it has ceased to be in contact with the hand that throws it? Since Aristotle supposed that a) whenever there is motion there must be something which imparts the motion, and b) mover and moved must be in contact, he was led to conclude that the air displaced in front of the projectile somehow rushes round it and pushes from behind, thus propelling the projectile along. This theory was still in vogue among Aristotelians of the sixteenth century, despite the fact that a thousand years earlier Philoponus had had no truck with it. He proposed instead, much more plausibly but still erroneously, that a projectile moves on account of a kinetic force which is impressed on it by the mover and which exhausts itself in the course of the movement. Philoponus compares this impetus or 'incorporeal motive *enérgeia*', as he calls it, to the activity earlier attributed to light.

Once projectile motion was understood in terms of an impetus in this way, it became possible for Philoponus to reassess the rôle of the medium: far from being responsible for the continuation of a projectile's motion it is in fact an impediment to it (*In Phys.* 681). On this basis Philoponus concludes, against Aristotle, that there is in fact nothing to prevent one from imagining motion taking place through a void. As regards the natural motion of bodies falling through a medium, Aristotle's verdict that the speed is proportional to the weight of the moving bodies and indirectly proportional to the density of the medium is disproved by Philoponus through appeal to the same kind of experiment that Galileo was to carry out centuries later (*In Phys.* 682-84)....

4.1 *On the Creation of the World*

Perhaps some fifteen years (the date is disputed) after his attack on Aristotle on the eternity of the world, Philoponus published a commentary on the biblical creation story, *On the Creation of the World* (*De opificio mundi*), which is his only theological work extant in Greek. While discussing the biblical text Philoponus frequently refers to philosophers like Aristotle, Plato and Ptolemy as well as to St. Basil the Great, whose own treatise on the creation served him as inspiration. The *De opificio mundi* has received some attention from historians of science, because Philoponus suggests at one point (I 12) that the movement of the heavens could be explained by a 'motive force' impressed on the celestial bodies by God at the time of creation. As we have seen (2.2 above), Philoponus discussed impetus theory for the first time in the context of forced motion, as when one shoots an arrow with a bow; now he applies the theory to the regular and natural motions of the universe at large. Significantly, Philoponus compares the rotation implanted in the celestial bodies to the rectilinear movements of the elements as well as to the movements of animals: curiously, these are all understood as natural motions that are due to the creator's divine impetus. In virtue of this bold suggestion Philoponus is often credited with having envisaged, for the first time, a unified theory of dynamics, since he strove to give the same kind of explanation for phenomena which Aristotle had to explain by different principles, depending upon their different cosmological contexts.